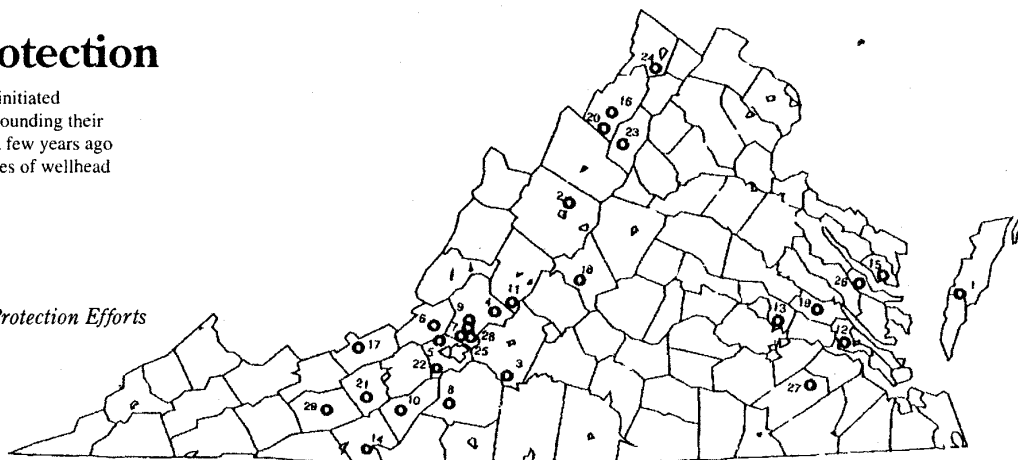


## Wellhead Protection

Twenty-nine localities have now initiated programs to protect the areas surrounding their public water supply wells. Only a few years ago there were fewer than ten examples of wellhead protection in Virginia.

○ Locations of Wellhead Protection Efforts  
September 1995



- 1 Accomack/Norhampton PDC
- 2 Augusta County PSA (14 systems)
- 3 Bedford County PSA (10 systems)
- 4 Buchanan
- 5 Catawba Hospital
- 6 Craig County
- 7 Daleville Water, Inc.
- 8 Ferrum PSA
- 9 Fincastle, Town of
- 10 Floyd County PSA

- 11 Glasgow, Town Of
- 12 James City County
- 13 Henrico County
- 14 Hillsville, Town of
- 15 Lancaster County
- 16 Mt. Jackson/Lord Fairfax PDC
- 17 Narrows, Town of
- 18 Nelson County PSA/Thomas Jefferson PDC
- 19 New Kent County
- 20 New Market/Lord Fairfax PDC

- 21 Pulaski County
- 22 Roanoke County
- 23 Stanley, Town of/Lord Fairfax PDC
- 24 Stephens City/Lord Fairfax PDC
- 25 Troutville, Town of
- 26 Urbanna, Town of
- 27 Waverly, Town of
- 28 Williamsburg Court Water Inc.
- 29 Wythe County

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## I. PERSPECTIVE

### Steering Committee Takes Stock

Every organization needs to periodically re-examine its activities to see whether its assumptions are correct and whether the needs it addresses have changed. The Virginia Ground Water Protection Steering Committee (GWPC) has begun such a re-examination and will soon be developing a report, the *1995 Supplement*, containing its findings and recommendations.

In 1987, the GWPC developed the initial *Ground Water Protection Strategy for Virginia*. In 1990, the first *Supplement* to this *Strategy* was produced but many changes have occurred in the state and nation since then. What should the ground water priorities for Virginia be now and for the next five years?

In order to take into account a wide range of views about ground water needs and priorities, representatives from business, industry, conservation groups,

*continued on page 2*

local governments and others were asked to contribute their thoughts over the past summer. The results of these detailed interviews were assembled to yield a composite perspective. This composite will be one input to the GWPSC's own deliberations.

Among the issues the GWPSC will address are water quality and quantity; prevention and remediation; and regulatory versus non-regulatory approaches to ground water protection. The *1990 Supplement* contained a list of 14 recommendations addressing ground water management areas, wellhead and aquifer recharge protection, storm water management, private well construction practices, well testing, septic tank/ground water separation and data management. The GWPSC will assess how well these recommendations have been followed. In writing the *1995 Supplement* the GWPSC will draw on public input and other sources of information to prioritize the activities of ground water protection, including various tools and services that

#### Agencies on the Ground Water Protection Steering Committee

- Department of Environmental Quality (Chair)
  - Water Division
  - Waste Division
- Department of Health
  - On-site Sewage and Water Program
  - Public Water Supply Program
- Department of Housing & Community Development
- Department of Mines, Minerals and Energy
- Department of Agriculture & Consumer Services
- Department of Conservation & Recreation
- Cooperative Extension Service
- Department of General Services (Consolidated Laboratory)
- Chesapeake Bay Local Assistance Department

will enable the state to implement its goals.

Although the GWPSC will discuss its findings further before reaching final conclusions, initial response suggests that considerable progress has been made on the 1990 proposals. Nonetheless, further progress will likely become increasingly difficult. Under the guidance of the

GWPSC, the state has already implemented the least difficult ground water protection measures. Further progress may be more difficult and may require some change in approach or tools. One of the things that was learned, however, in conversations with many diverse groups is how many people rely on ground water to support their business, their farm, their family and their community. Additional ways for state agencies to work together and to combine efforts with local government and the private sector will be crucial to protecting ground water for the use and enjoyment of future generations.

If you have opinions about any of the topics listed above, please submit them to Mary Ann Massie at P. O. Box 10009, Richmond, VA 23240-0009, and they will be brought to the attention of the GWPSC. If you would like to attend a GWPSC meeting, call her at (804) 698-4042 for the schedule. When completed, copies of the *1995 Supplement* can be requested by calling this same number.

### Who Uses Ground Water: Do You Know?

Ground water is such a part of our lives that we often take it for granted - it is "out of sight," after all. Some people don't know that the water they are using or the product they are consuming is derived from ground water. In Virginia, we use almost 50 billion gallons of ground water each year. Who are we?

- Thirty-eight of Virginia's 95 counties are 100% dependent on ground water for public water supplies - 55 counties draw 50% or more of their public water supplies from ground water.
- Of Virginia's 2,500 public water supply systems, 2,300 community/non-transient systems use ground water - many of these systems are small and remote from any surface water supply reservoirs and must rely on ground water.
- In 60 of the state's counties, the majority of households obtain water from their own private wells.
- In 52 of the state's counties, wells are growing in importance - the increase in the number of households served by private wells was greater than the number added to public

systems between 1980 and 1990.

- The typical ground water user household is a family consisting of 2-4 members.
- Of the half-million households using individual wells, 92% also use septic tanks - a combination that can bring problems unless both are designed and operated properly.
- Thirty-one percent of private well users are on lots of 1 acre or smaller.
- Thirty-five percent of those with wells use fuel oil as their source of heat, presenting another potential threat to the household's water supply.
- Heaviest reliance on individual wells is outside the state's urban centers in rural non-farm areas, where new growth frequently takes place beyond the foreseeable reach of public water or sewer lines.
- A home is most people's biggest investment - 83% of those using individual wells own their home - more than half are still paying their mortgage - keeping their water supply clean is essential to protecting these families property values.

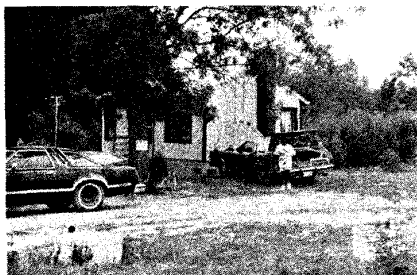
- Replacing a water supply that has become contaminated is expensive and many home owners using wells are of modest means - 36% of houses using individual wells cost \$50,000 or less in 1990 - 34% cost \$100,000 or less.
- As tax payers and voters, home owners using individual wells make up the majority of citizens in nearly 2/3 of Virginia's counties.
- Industry, too, relies on clean ground water for food, paper and polymer production - leaders include Burlington Industries, Coors Brewing Company, E.I. DuPont De Nemours, Holly Farms, Perdue Farms and Virginia Power.

As the state population increases ground water will become an increasingly important resource. It is crucial that good management of the resource be tied to our state and local economic development efforts so that an ample potable supply is protected for future Virginians. We must remember who we are and keep our ground water interests in mind as we make other public and private decisions.

## II. ACTIVITIES and SERVICES

### *Alternative Waste Water System Meets Community Need*

Tangible results can come after years of persistence, effort, and ingenuity. This year a permit was approved by the State Department of Health for a constructed wetland septic system drainfield in Piney River. That approval signaled a very significant breakthrough - the beginning of a viable water and waste water system for this low income, largely minority community in Nelson County, Virginia. Without this innovative, yet simple technology, Piney River residents' drinking water would continue to be contaminated by their own septic drainfields or, in some instances, out-houses. A 1982 study found that 82 percent of the Piney River families were drinking water contaminated with sewage. Since then residents have grown accustomed to carrying gallon jugs of drinking water to their houses from two community wells. Further increasing the burden of the situation, the local government had not been able to grant building/renovation permits or allow other development in areas with poor soils. This has meant that resident's homes, which were in need of major rehabilitation, could not be improved. As a result, land values diminished along with residents' ability to sell their property. It was a "no win," "no good option" situation until this innovative alternative of a constructed wetland was considered. Until this alternative became a reality, residents were trapped in living condi-



tions that some saw as corresponding more to what could be found in the Third World rather than in one of the world's most prosperous nations.

The problem in Piney River is that the region suffers from a unique natural setting, characterized by gray-white soils that become a dust bowl when dry and which cake onto shoes when wet because of its clay-like properties. These soils do not properly filter sewage. To combat

this problem, a model drainfield in the form of a 20 foot by 10 foot artificial wetland was constructed and hooked to one resident's home as an experiment. Sewage flows from the toilet into a septic tank and from there to the artificial, rubber-lined wetland, where bulrushes planted amidst rocks soak up the nutrients and cleanse the water. The clean water is then transported via underground pipe to a ditch for discharge.

Because of the success of this initial wetland drainfield, construction of a larger wetland that could potentially serve up to 400 families in Piney River has now begun. Initially, 59 households, a local church club and a general store will benefit from this \$2.2 million project funded primarily with Housing and Urban Development Community Development Block Grant funds. Other providers of financial and/or staff support include the U.S. Department of Agriculture, the Virginia Water Project, the Thomas Jefferson Planning District Commission, Nelson County, and Nelson County Community Development Foundation. Part of this money is going to the renovation of almost half of the 59 homes that are to be hooked onto the system.

Septic systems that do not function properly continue to play a major role in drinking water contamination. That is why Virginia's 1987 *Ground Water Protection Strategy* identified these systems as one of the top potential sources of ground water contamination. The introduction of region specific, innovative technologies such as the Piney River wetland is a positive step toward reaching the state's ground water protection goals and illustrates how flexible approaches can be developed that protect ground water while addressing vital community needs. Cooperation and persistence are key ingredients.

The GWPSC will be observing this Piney River project and discussing ways that other alternative technologies might assist the state and its communities in protecting their all important ground water.

For more information on the Piney River Wetland Project contact: Kobby Hoffman, Thomas Jefferson Planning District Commission, (804) 979-7310, or Jason Gray, Virginia Water Project, (540) 345-1184.

### *Wellhead Protection Workshops Offer Technical Assistance*

This summer the Ground Water Protection Steering Committee sponsored three wellhead protection workshops. The first took place in Salem in Southwest Virginia, the second in Harrisonburg in the Shenandoah Valley, and finally, after the pending hurricane Felix forced the workshop to be re-scheduled, the third was held in Newport News in Tidewater. Bruce Dotson of the Institute for Environmental Negotiation facilitated these three workshops.

Ground water is a valuable, but also a vulnerable, resource. The threats to underground drinking water include a variety of every day activities. These include septic systems, sewer lines, household lawn, automotive and pool chemicals, urban run-off, dry cleaners, photography and print shops, gas stations, pesticide applications, animal feedlots and landfills. Nobody intends facilities to leak, but if they do, they should not be sited in the recharge area of a public water supply. Adequate wellhead protection will help to protect against these potential threats and ensure that this resource is preserved. Because remediation is either impossible or very costly, prevention of contamination is essential. The objective of wellhead protection is not to prohibit the above-mentioned uses but to implement management procedures and perhaps ensure that certain land uses occur outside of the wellhead protection area so that the resource is available for continued growth and development.

Attendees included individuals from the federal, state and local governments - local planning departments and public utilities, state departments such as Health and DEQ and the United States Geological Survey - and private consultants. The variety of roles that participants represented demonstrates the interdisciplinary nature of the task at hand. Participants at these workshops benefitted from training and discussion of various methods of wellhead protection. Sophisticated technological as well as inexpensive and simple approaches were addressed. Communities need to assess the resources they have and to develop programs that best fit their unique circumstances. After establishing study areas and conducting

*continued on page 4*

reconnaissance studies, participants are encouraged to use planning, non-regulatory and regulatory approaches for wellhead protection.

At each workshop, panelists from nearby communities shared their experiences and presented the methodology they used to implement wellhead protection. Terry Herrington explained how Roanoke County adopted a wellhead protection overlay district for three wells in the pilot study area. The overlay district recently became part of the county zoning ordinance. He recommends setting up an interdisciplinary team which might include a planner, a geologist, a county utilities representative, and perhaps a building official. He also emphasized the importance of public involvement and informing property owners. Chuck Supan explained that because the Town of Fincastle does not have the land-use authority to protect wellheads outside its jurisdiction in Botetourt County, a high degree of County/Town cooperation was necessary to adopt wellhead protection measures. Together the town and county applied for and received U.S. Environmental Protection Agency funding for wellhead protection. Understanding the land use impacts is key to wellhead protection in these areas. Mr. Supan mentioned vulnerability mapping, contingency planning, the Farm-A-Syst program, and the Conservation Reserve Program as possible non-regulatory techniques and programs that could be useful for wellhead protection.

Jeff Slack described the Lord Fairfax

Planning District Commission's wellhead protection work at the August workshop in Harrisonburg. A total of thirteen wells from the communities of Mount Jackson, New Market, Stephens City and Stanley were included in the PDC's wellhead protection planning process. The steps used in each community consisted of: 1) determining the extent of the land area to recommend for study and protection; 2) identifying potential contamination sources; 3) describing and recommending protective procedures; and 4) preparing contingency plans in the event of contamination. For each of the 13 wells, a fixed radius method was used to delineate the wellhead protection area because of the lack of other technical data and resources.

Terry Pettit described wellhead protection planning for the Town of Stanley in more detail. As a long time Town resident, as a person active in many voluntary organizations, and as the Town Superintendent, he has been able to promote wellhead protection on a one-on-one basis. Cooperation so far has been excellent. Manufacturing is the area's major employment base. Because the ground water flow and recharge patterns around the Town's five wells was virtually unknown, the community sought and obtained an EPA Wellhead Protection Demonstration Grant of \$34,625 to hire a consultant to do computer modeling, to determine aquifer properties and to better estimate the recharge and flow patterns impacting the Town's primary well. Following this initial project grant, the Town Superintendent and the Lord

Fairfax PDC will work with the town and county planning commissions to set up a special wellhead protection ordinance.

In Henrico County, improperly abandoned wells pose one significant concern to ground water. Haywood Wigglesworth, a Department of Public Utilities geologist and ground water specialist, discussed the County's 57 public water supply wells, most of which are privately owned. The County's studies now allow the Planning Department to use ground water information in site plan review or in other planning activities. When an abandoned well is discovered in this process, it can be properly sealed to prevent ground water contamination. As part of a public education program, a brochure about wellhead protection was distributed through utility billings and flyers posted around the County.

Larry Malcolm of the Town of Waverly discussed how a community highly dependent on ground water but without zoning, can design and implement a wellhead protection plan through cooperative efforts with its customers.

If you, your community or your organization is interested in wellhead protection, contact Mary Ann Massie at (804) 698-4042 and request copies of the *Wellhead Protection Handbook* and *Case Studies of Six Local Governments in Virginia*. These books offer many helpful and practical hints about getting started with wellhead protection.

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## ***"Unwanted Pesticide" Program Continues Popularity***

The Virginia Department of Agriculture and Consumer Services (VDACS) conducted its fifth annual Pesticide Disposal Program this Fall in 12 localities. This year's localities were the counties of Caroline, Greene, Halifax, Louisa, Madison, Mecklenburg, Orange, and Spotsylvania, and the cities of Chesapeake, Fredericksburg, Norfolk and Virginia Beach. The 1995 program was available to agricultural producers, pesticide dealers and pest control firms in these localities. This year's program collected more than 70,000 pounds of unwanted pesticides. In Madison County alone, more than 9,200 pounds of unwanted pesticides were turned in.

Since the program's inception in 1990, VDACS has assisted 900 individuals and firms with the safe removal and destruction of more than 379,000 pounds

of banned, canceled and unwanted pesticides. The direct cost of the Program to date is greater than 1.2 million dollars. It has been completely funded through EPA grants to state agencies - VDACS, the Department of Environmental Quality (DEQ) and the Department of Conservation and Recreation (DCR) - and pesticide fees collected by VDACS. No general fund or other tax dollars have been used to support this effort.

VDACS plans to continue this program as long as funding is available to support it, and hopes to offer it to all Virginia localities with pesticides requiring disposal. To fund a 1996 effort, VDACS has submitted grant proposals to EPA through DCR under the Section 319 Non-point Source Program and through the Chesapeake Bay Program. DEQ will

also support the 1996 effort with funding from an EPA ground water protection grant.

For more information about Virginia's Pesticide Disposal Program, contact Dan Schweitzer at VDACS, Office of Pesticide Services, at (804) 371-0152.



## Recycle Those Pesticide Containers

The disposal of plastic pesticide containers has increasingly become a problem for agricultural producers and custom applicators. Air quality and solid waste regulations are today more restrictive, resulting in fewer options for agricultural pesticide users to properly dispose of their empty pesticide containers. In an effort to assist the agricultural sector with the disposal of plastic pesticide containers, the Virginia Department of Agriculture and Consumer Services (VDACS) implemented a Plastic Pesticide Container Recycling Program.

The program is a cooperative effort between VDACS, the Virginia Pesticide Control Board and local governments. It is operated under the guidelines of the Agricultural Container Research Council (ACRC), a consortium of pesticide manufacturers, which coordinates a nationwide program and provides training materials, contractors for the granulation of the containers, and recycling of the granulated plastic. The 1995 Program is the third year VDACS has administered the program in Virginia.

The program has grown from six localities and two pesticide dealers in 1993 to sixteen localities and three pesticide dealers in 1995. The number of plastic pesticide containers recycled has also grown - 35,185 containers were recycled in 1993 and 41,168 in 1994. Though the number of containers accepted for recycling during 1995 is not yet available, it is anticipated that the number will be greater than 1994.

## EPA Gives OK to Virginia Pesticide Plan

Virginia's *Generic State Management Plan (GSMP)* for pesticides in ground water was submitted last year to the Environmental Protection Agency (EPA) Region III for their review and concurrence. This summer, EPA granted its approval, noting as well a number of areas the state would need to address in future plans and activities. EPA's action means that Virginia is well positioned to respond when additional federal limitations are imposed on certain pesticides. At that time, the state will need to develop a Pesticide-specific State Management Plan (PSMP). Had the state not developed this generic plan first, it would have had to start from scratch and be under greater time pressure to address the new restrictions. The GSMP was drafted by a committee of state agency representatives, private citizens representing the agricultural and water user sectors, and two citizens advisory board members. The committee was chaired by the Virginia Department of Agriculture and Consumer Services.

The GSMP sets out Virginia's overall strategy and general approach to managing pesticides which EPA considers highly soluble and potential threats to ground water from their normal labeled uses. Virginia's GSMP is based on a "graduated response" philosophy measured against the Maximum Contaminant Level (MCL) or Health Advisory Level (HAL) of a pesticide. When a pesticide is found in ground water, no more and no less a response will be made than is called for by the severity of the problem. Responses to detections of a pesticide in

EPA recently announced its intent to list the following five pesticides as requiring a PSMP

- Atrazine
- Alachlor
- Cyanazine
- Metachlor
- Simazine

ground water may vary from increased education and voluntary Best Management Practices to restrictions on the use of a pesticide or a complete moratorium on its use. The specific response to be chosen will be determined in the PSMP to be prepared in the future.

As state lead agency for development and implementation of State Management Plans (SMPs), VDACS will be the source of all information and updates about the status of any SMP procedures. Once EPA publishes a Federal Rule listing pesticides requiring SMPs, VDACS will convene a Planning Committee consisting of the Virginia Cooperative Extension, the Department of Health, the Department of Environmental Quality and the Department of Conservation and Recreation.

Copies of Virginia's *Generic State Management Plan* are available from the Office of Pesticide Services, Virginia Department of Agriculture and Consumer Services, at (804) 371-6558.



## TankTalk: Above Ground, Below Ground and Septic

### • Above Ground Storage Tank Monitoring Aims at Pollution Prevention

As part of the Above Ground Storage Tank (AST) Ground Water Monitoring Program, facilities with an aggregate oil storage capacity of more than 1,000,000 gallons submit a Ground Water Characterization Study (GCS) and then file annual ground water monitoring reports. The intent of the GCS is to inventory ground water and its "before" condition at these large storage facilities as part of natural resources identification for oil spill contingency planning. Data from GCS reports is the basis for subsequent ground water monitoring under the AST Pollution Prevention program.

AST ground water monitoring is intended to detect a discharge at a facility before contaminants can migrate

*continued on page 6*

off-site. Early detection of a discharge to ground water gives facility operators the opportunity to contain remediation costs as well as protect valuable natural resources. Monitoring wells used in this program are the same monitoring wells installed for or identified in the GCS.

Flexibility was built into both the GCS and the AST Monitoring programs. For example, a site characterization report containing all necessary site geology, hydrogeology and analytic data required by the GCS can be submitted in lieu of conducting additional field studies. Also, if ground water monitoring is being required by another state program or federal agency, AST monitoring can be waived.

Statutory changes were made to state law affecting the AST Program. Facilities not engaged in the resale of oil are exempt from ground water monitoring requirements until a later date determined by the DEQ. In addition, variances from specific pollution prevention requirements can be granted based on factors such as tank size, use and location.

In a continuing effort to streamline government services, provide uniform regulations, eliminate duplication and increase efficiency, DEQ has proposed a Notice of Intended Regulatory Action (NOIRA) to amend and combine regulations in the AST program. Key proposals will be the elimination of fragmented definitions and inclusion of criteria for granting variances for facilities not engaged in the resale of oil. Regulatory changes are expected to have a direct beneficial impact on the AST ground water monitoring program by improving reporting efficiency. An advisory group composed of state, federal and local agencies, industry, manufacturers, facility owners and operators, environmental groups and the public will provide input into the content of the new regulation.

For information about AST requirements, contact Vanessa Birrell at 804-698-4284.

- **Underground Storage Tank Program is Streamlined**

Many changes took place in 1995 in the Department of Environmental Quality's Leaking Underground Storage Tank (LUST) program. Reimbursements and responsible party cleanups were streamlined and simplified in order to effect better cost controls on corrective action and make the program more user friendly to the regulated community.

A year ago, DEQ ground water staff focused on the backlog of unresolved LUST cases and closed out over three

thousand sites in just two months. This allowed regional office staff to concentrate on the more important cases that represented risks to both human and other biological receptors. In conjunction with this, DEQ also reaffirmed its commitment to the use of risk-based cleanup endpoint numbers rather than rigid numeric standards.

New manuals for both the technical and reimbursement projects were developed, issued, and explained to the DEQ staff, the regulated community, and geotechnical consultants. The LUST program now requires that corrective action activities, other than emergency initial abatement measures, be pre-approved by DEQ in order to be eligible for reimbursement. Coupled with this pre-approval is a listing of "usual and customary rates" (UCR) for corrective action services and reports. These "UCRs" serve as a guide for reimbursement costs for specific services.

Several significant projects where the state is taking the lead using Virginia Petroleum Storage Tank Funds and Environmental Protection Agency LUST Trust Funds were completed during 1995. A major water supply line was completed to serve the town of White Post in Clarke County. Work on a similar project in Culpeper County was initiated and is under way. State lead projects continue to provide and maintain carbon filtration units for almost 100 homeowners whose wells have been contaminated by petroleum hydrocarbons.

Program highlights for 1995 include:

- the LUST Program became more streamlined and user friendly;
- 1,103 new confirmed release LUST cases were reported;
- over 3,000 backlogged cases were closed;
- new LUST technical and reimbursement manuals were put to use following training to DEQ staff, tank owners, and consultants;
- 831 reimbursement claims were received; and 692 claims were processed;
- \$14,233,491 was paid out in reimbursements;
- DEQ now requires site corrective action activities to be pre-approved to be eligible for reimbursement.

For information about the LUST program and current procedures, contact Dave Chance at (804) 698-4288.

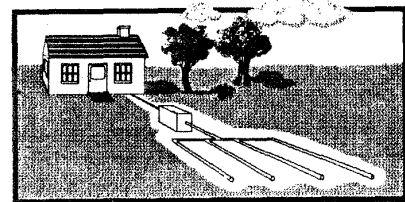
- **Septic Tank Regulations Ready to Move Forward**

The Department of Health's Division of On-site Sewage and Water Services plans to have the revised on-site regulations ready for public hearings before the end of the year. These proposed revisions will provide greater public health and environmental protection by increasing the separation distance from a drainfield to a water table or other soil restriction. At the same time, the Division proposed to reduce the minimum installation depth of a system and to allow more effective use of pretreatment systems. The combined effect is expected to result in fewer septic permit denials statewide. Other changes include redefining rock, establishing mass drainfield standards, creating a framework that encourages innovative system technology and reducing red tape.

Also, effective August 1, 1995, the Department of Health, in cooperation with DEQ, will begin permitting residential spray irrigation systems with flows less than or equal to 1,000 gallons per day. This type of system will provide one more alternative waste water system for citizens. It will not be a "cure-all" for land that doesn't "perc," but the Department of Health does expect that this option will provide an environmentally safe and sanitary sewage treatment and disposal for many landowners.

The Department of Health is also preparing for a comprehensive review of the Discharging Regulations under Executive Order 15. Of specific concern to the Department are difficulties with the operation and maintenance requirements of the existing regulations and the inability of many aerobic treatment units to meet discharge limits under DEQ's General Permit.

If you are interested in any of these changes, contact Gary Hagy at (804) 786-1750.





## ***Virginia Companies Commit to Nutrient Management***

In an effort to assist the Commonwealth in achieving its goal of reducing the volume of nutrients entering the Chesapeake Bay 40 percent by the year 2000, Virginia's poultry processing industry has committed to requiring all of its new poultry growers to operate under nutrient management plans. Adopting nutrient management practices will not only help protect surface waters, but ground water quality, too. Nutrient management involves the careful applications of manures and fertilizers at the times and in the amounts that correspond to crop needs. The result of applying just the right amount of nutrients at the times when the plants will absorb them is a significant reduction in excess nutrients - nitrogen in particular - that can dissolve and filter through the soil into ground water.

WLR Foods, Rocco, Tyson Foods and Perdue Farms are four Virginia companies that have committed to nutrient management. Although the four companies have growers throughout the state, the major concentrations of their growing operations are in the Shenandoah Valley and on the Eastern Shore. Both the Valley and the Eastern Shore are considered to be more vulnerable to ground water contamination than many other regions of the state because of their physiographic characteristics, so the increased use of nutrient management among major farming operation in these areas represents an important step forward in protecting Virginia's ground water.

The state will pick up the costs of analyzing the nutrient content in the soils, an important part of the planning process, and in helping the farmers develop and put their plans in place. The state is working to develop a certification program through which individuals can be certified to develop state-of-the-art nutrient management plans. This type of public-private partnership can serve as a model for a wide variety of activities found throughout Virginia.

For more information about this innovative program, contact Sarah Pugh at (804) 786-3539.

## ***New General Permit for Animal Operators***

In November, 1994, the State Water Control Board's new general permit that governs the storage and handling of waste from agricultural facilities where animals are raised in confinement, such as hog houses, went into effect. The general permit, which is part of the Virginia Pollution Abatement (VPA) permit system, offers an alternative to individual VPA permits. The general permit spells out the rules for designing and operating the waste systems for hog houses and other animal houses.

The new general permit applies to all confined animal feeding operations which contain 300 or more "animal units." The new general permit requires that all new earthen waste lagoons have either a synthetic (usually plastic) liner or a clay liner, and the liner must be of sufficient thickness and composition to, for all practical purposes, prevent the liquid waste from leaking out of the lagoon. This, in turn, prevents the liquid waste from seeping into ground water.

In addition, the new general permit

requires a nutrient management plan to be developed in every case. A nutrient management plan prescribes the methods for applying waste to the land as fertilizer and the times at which the applications should be made, all so that the plants use most of the fertilizer, leaving little to run off or to seep into ground water.

From the reactions that have been heard, farmers tend to like the new general permit because it tells them exactly how to plan their new animal facilities and because it is simpler than the individual permit process. To come under the general permit, the farmer follows the design and management planning rules in the general permit, obtains certain approvals and certifications to show that he or she has followed the rules, and then simply registers with the Department of Environmental Quality.

For more information about the new general permit, please call your local Department of Environmental Quality regional office.

## ***Researcher Finds Ground Water One Key to Bay Quality***

Over the past year, Dr. William Reay at the Virginia Polytechnic Institute and State University (VPI&SU) has been conducting a study to evaluate the ground water nitrogen contribution that would link upland areas to adjacent tidal waters. The study, funded through the Chesapeake Bay Program, is being conducted in the Cherrystone Inlet watershed, a Bay-side watershed located on Virginia's Eastern Shore in Northampton County.

Field efforts have included the monitoring of a watershed well network (>70 wells), nearshore ground water discharge and sediment nutrient flux studies, and surface water quality surveys. Dr. Reay has found that shallow ground water quality is related to land use, with agricultural and residential land (using on-site waste water disposal systems) exhibiting inorganic nitrogen levels approximately two orders of magnitude greater than estuarine surface waters and shallow ground water underlying forested areas.

A Geographical Information System (GIS) model and data base has been developed to delineate high-risk shorelines with respect to the volume of ground water discharge and nitrogen loadings from associated land uses. This approach is directly applicable to similar coastal plain watersheds. The Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation (DCR-DSWC) intends to cooperate with VPI&SU to make the GIS model available to resource agencies who are promoting best management practices (e.g., nutrient management and vegetative buffer strips) to reduce nitrogen loadings to the Chesapeake Bay. This methodology could function as a means to address nitrogen reductions as part of Virginia's tributary strategies for the Chesapeake Bay.

In conjunction with delineating nitrogen-enriched ground water discharge areas in the Cherrystone Inlet watershed, efforts are underway to reduce ground water nitrogen loadings to surface waters. Optimal locations are being selected for vegetative buffers. Native warm season grass buffers (e.g., switch grass and gamma grass) are being established in plots adjacent to agricultural fields. VPI&SU is monitoring these plots to determine the amount of nitrogen that is removed from shallow ground water that flows through the root zone of the grasses. A Field Day will be held in the watershed during the Spring of 1996 to promote further the use of warm season grasses in vegetative buffers along the Bay shoreline.

For further information, please contact Charlie Lunsford, DCR-DSWC at (804) 371-8984.

## ***Atrazine Monitoring Finds No Violations***

As part of a twenty state study, the Department of Agriculture and Consumer Services (VDACS), completed a ground water survey of shallow drinking water wells for the presence of atrazine, a corn herbicide, and three of its degradation products. The study was conducted in cooperation with CIBA-GEIGY, the registrant for atrazine. Fifty-nine drinking water wells were sampled in areas of Virginia with historically high atrazine use to determine whether the normal labeled application of atrazine was contaminating the surficial aquifer.

Of the 59 wells sampled, 8 had detections of atrazine between 0.1 and 0.7 parts per billion (ppb). The Maximum Contaminant Level (MCL) for atrazine established by EPA under the Safe Drinking Water Act is 3.0 ppb. Though the sample base is not large enough to state categorically that atrazine is not present in Virginia's ground water at levels of concern, the data does indicate that atrazine does not appear to be impacting the ground water at levels approaching the MCL. The wells sampled under this program were in areas of high atrazine use.

In addition to atrazine, the samples were analyzed for the pesticides simazine, prometon, propazine, ametryn, prometryn, metalaxyl, metolachlor, cyanazine, as well as nitrate. None of the pesticides were detected in any of the samples near the established EPA standards. Thirteen of the wells were found to exceed the EPA standard for nitrate (10 ppm) ranging between 10-40 ppm. The source of the nitrate contamination was not determined, but could come from fertilization or septic systems.

For further information about this study, contact Dan Schweitzer at (804) 371-0152.

## ***Educational Program Targets Audiences***

### **• Suburban Home Owners**

Home owners in Prince William County, Arlington County, Chesterfield County, the City of Virginia Beach, and the City of Hampton have benefitted from programs offered by Virginia Cooperative Extension on the proper use of fertilizers and pesticides to protect water quality. Where applicable, education about on-site septic alternatives is also part of the educational program.

The program - offered as a model for

suburban non-point source pollution control - involves scores of volunteers who learn environmentally sound lawn care techniques and then provide one-on-one assistance to others. Presurveys and experience indicated that a sustained, focused educational approach was required to bring actual implementation of water quality protection measures into suburban residential areas.

Where these educational programs have been implemented, it is estimated that nitrogen application has decreased from 5 pounds to 3 pounds per 1,000 square feet per year. Over 12,500 square feet of yard waste have been composted on site, thus removing it from landfills. The educational program has resulted in a 30 percent reduction in pesticide usage. Each of these results has significant impact on the reduction of ground water pollution.

For additional information, contact Waldon Kerns at (540) 231-7995.



### **• Rural Households**

Water quality testing and information programs for rural households have been conducted in twenty-four Virginia counties since 1989. The objectives of this program are to: 1) improve the quality of life of rural home owners and the general environment by increasing awareness and understanding of water quality problems, protection strategies, and treatment alternatives; and 2) create a ground water quality data inventory to assist local governments in land use and ground water management planning.

The program is made available to county residents through local Virginia Cooperative Extension Offices on a first-come, first-serve basis. Funding is provided by local governments, agencies, and citizen organizations in addition to participants who are assessed a minimal testing fee. Two types of water sample kits were distributed to interested persons:

1) general water chemistry analysis for iron, manganese, hardness, sulfate, chloride, fluoride, total dissolved solids, pH, saturation index, copper, sodium and nitrate; and 2) microbiological testing (total and fecal coliform/E. coli bacteria). Participants receive instructions for collecting their own water samples and deliver them to the extension office on assigned collection days.

Two public meetings are held in each county. The first meeting is held before testing to explain: 1) local hydrogeologic characteristics in relation to ground water pollution; 2) likely sources of and activities contributing to ground water contamination; 3) the nature of household water quality problems (both nuisance and health-related); and 4) procedures for participation in the water testing program. The second meeting is held after testing to disseminate and to discuss test results with participants and to suggest management practices that might be implemented to reduce or to prevent water contamination.

Nearly 5,000 households in twenty-four counties have participated in the program. In addition to test results, information is also collected about each sample, such as type of water source, water source environs, proximity to contaminant sources, and treatment devices installed. On the basis of this information and the results of the general water testing program, additional samples from a limited number of "high-risk" households are selected for testing of various chemical compounds, such as pesticides and PCBs.

In all twenty-four counties, the most widespread problem identified was bacteriological contamination. Overall, testing revealed that nearly 50% of the samples tested positive for total coliform and more than 15% tested positive for fecal coliform/E. coli bacteria. Analysis for pesticides and other chemical compounds revealed little evidence of such contamination, even though "high-risk" supplies were targeted.

Following the after-testing public meetings, an evaluation survey was mailed to participants. Respondents indicated that the primary reason for their participating in the program was concern about the safety of their water supply and that the project increased their understanding about water quality. More than two-thirds of the households, who reported having at least one water quality problem, had taken or planned at least one measure to improve the quality of their water supply, such as shock chlorinate the water system, conduct a follow-up water



analysis, or seek state agency assistance in correcting problems.

Throughout the course of the programs, local government and public officials were kept apprised of the general water quality results. All water quality test results, along with pertinent water supply characteristics, were entered into a computer database. (To assure confidentiality of test results, all references to individual's names, addresses, and telephone numbers were purged from this listing.) The database was developed to support further analysis, mapping, and use by county or regional planners. Information will be ultimately available in report form for each of the participating counties.

For additional information, contact Blake Ross at (540) 231-4702.

#### • Farmers

Water wells and springs are the most common sources of private household water for farmsteads in Virginia. However, activities related to these farmsteads may contribute to contamination of the ground water that so many rural residents depend upon for household water. For example, farm facilities such as chemical and fuel storage tanks, livestock and poultry holding areas, irrigation systems, and septic systems are sometimes located near the farmstead well or spring. Retail agribusinesses and enterprises such as nurseries, greenhouses, and direct farm markets are unique operations that may have production, storage, and sales areas close to a water well that may be also used by the general public. Inadequate maintenance of wellhead and farmstead facilities and/or poor farmstead management practices can contribute to contamination of ground water and water supplies. Rural residents need to be aware of threats to water quality and of measures that will reduce or eliminate contamination of household water supplies.

To meet these challenges, as a part of a nationwide effort, the Virginia Farmstead (Pollution) Assessment System (Virginia Farm\*A\*Syst) was developed. This voluntary, educational/technical program is a preventive program designed to: 1) provide safe drinking water and thereby protect the health of Virginia's rural residents; 2) reduce potential landowner liability\*due to ground water contamination that may result from farmstead or retail agribusiness activities; and 3) maintain or enhance farm property values throughout Virginia. The effort is being led by the VPI&SU Department of Biological Systems Engineering and Virginia Cooperative Extension faculty.

The Virginia Farm\*A\*Syst package contains the following material:

Fact Sheet/Worksheet No. 1	-	Evaluation: Ground Water, Soils & Geology
Fact Sheet/Worksheet No. 2	-	Well and Spring Management
Fact Sheet/Worksheet No. 3	-	Household Wastewater Treatment & Septic Systems
Fact Sheet/Worksheet No. 4	-	Hazardous Waste Management
Fact Sheet/Worksheet No. 5	-	Petroleum Products Storage
Fact Sheet/Worksheet No. 6	-	Fertilizer, Storage, Handling, & Management
Fact Sheet/Worksheet No. 7	-	Pesticide Storage, Handling, & Management
Fact Sheet/Worksheet No. 8	-	Livestock & Poultry Yard Management
Fact Sheet/Worksheet No. 9	-	Livestock Manure Storage & Treatment Facilities
Fact Sheet/Worksheet No. 10	-	Poultry Litter Management & Carcass Disposal
Fact Sheet/Worksheet No. 11	-	Milking Center Wastewater Treatment & Management
Fact Sheet/Worksheet No. 12	-	Silage Storage & Management
Worksheet No. 13	-	Overall Risk Assessment

A Resource Directory is included which provides emergency and other telephone numbers for related agencies, a list of agencies where educational/ technical and cost-share program information may be obtained, and a list of educational materials for further reading.

Material development for the Virginia Farm\*A\*Syst is completed and is expected to be printed soon. The first in-service training for Virginia Cooperative Extension personnel has been conducted and additional in-service training is being planned for other agency personnel. Proposals have been submitted to potential sponsors for additional funds that will facilitate program implementation throughout Virginia.

For further information, contact Blake Ross at (540) 231-4702.

Statewide guidance is provided by a multi-agency advisory committee. The advisory committee includes one representative each from the Virginia Department of Conservation and Recreation-Division of Soil and Water Conservation, USDA-Natural Resources Conservation Service, Virginia Department of Agriculture and Consumer Services, and Virginia Farm Bureau Federation.

The Farm\*A\*Syst program guides an individual through a step-by-step evaluation provided by a series of Fact Sheets and Worksheets, addressing factors such as soils and geologic properties of the site, wellhead or spring condition, and farmstead management practices that may impact the quality of the ground water/ drinking water supply. The program participant can identify potential pollution sources, and make an assessment of pollution risks to existing water supplies. Based on identified risks, corrective measures and/or management practices can be selected to reduce the likelihood of future contamination or improve existing water quality.

### Grants Support Varied Projects

Under Section 319 of the Clean Water Act, grants are available to states to implement programs and projects to protect ground water and surface water from non-point source pollution. Since 1990 funds have been made available to state agencies and state university personnel, soil and water conservation districts, localities and non-profit groups for studies/projects related to ground water protection. Activities which have been conducted under this program include:

- Funding of pilot projects to evaluate constructed wetlands as a means of on-site sewage disposal
- Development of a state ground water vulnerability assessment related to pesticide usage
- Pilot monitoring of ground water quality in critical ground water areas in high agricultural pesticide use areas

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- Development of the FARM\*A\*SYST program for Virginia
- Funding for nutrient management specialists to provide technical assistance to farmers on proper application and timing of chemical and animal fertilizers
- Support for the Pesticide Clean Day collection and disposal program
- Near-shore ground water characterization and assessment of effects of ground water on adjacent surface waters
- Development of model ordinances for karst protection, related karst studies and employment of a karst protection specialist
- Ground water monitoring as a component of overall watershed projects in several areas including Shenandoah Valley, Clinch-Powell Basin, Albemarle County and the Northern Neck.

Funds under this program are limited and competitive but good projects are always sought.

For further information on this program contact Stu Wilson at (804) 786-4382.

### III. INFORMATION SOURCES

#### *GIS Links Computers and Communities*

Activities involved in wellhead protection can entail fairly heavy data management needs - needs that can sometimes best be addressed by a computer. A Geographic Information System (GIS) is a computer equipped with one of several mapping software programs, and loaded with data such as the location of water supply wells and the nature of land uses in their vicinity. The goal of GIS is a faster, more accurate, and less costly capability for seeing spatial relationships in a geographic area of concern. How does the location of a particular well compare with the location of businesses using potentially dangerous chemicals? What vacant areas zoned for industry could meet a prospective industry's needs and could these sites be developed without falling within the areas identified for wellhead protection? These are some of the questions that GIS systems can help address. What is often needed in wellhead protection is to bring together scientific and technical information, citizen awareness and support, and local government management capability and GIS has the potential to provide this linkage.

In any new endeavor there is always the need for someone to go first and to show that a new idea or capability can actually work. From these pilot efforts, others can learn what it takes to make the effort successful and even how they themselves might do it better. In the late

1980s and early 1990s, the Environmental Protection Agency made a series of grants to communities for the purpose of conducting pilot studies bringing GIS and wellhead protection together. A workshop held at the University of Virginia and organized by the Institute for Environmental Negotiation was based on the experience of six of these communities. They are:

- Dayton, Ohio
- Rochester, Minnesota
- Moultonborough, New Hampshire
- Carroll County, Maryland
- North Central Texas Council of Governments
- New Castle County, Delaware.

A number of conclusions emerged from workshop discussions:

- Many communities already have some of the data and maps that can feed into a GIS. A GIS system does not have to start from scratch; it can build on existing resources.

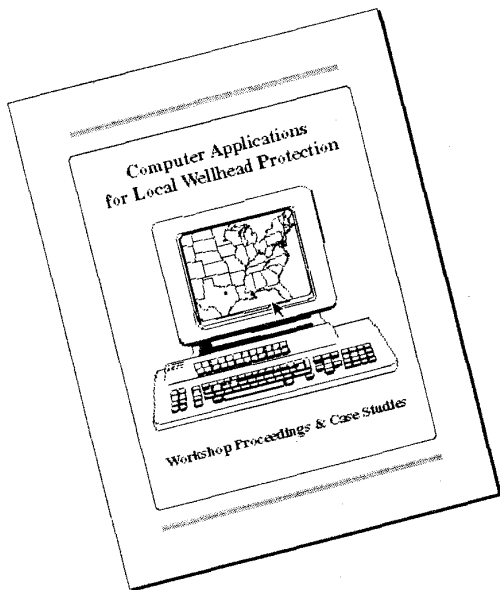
- At the same time, it must be recognized that considerable time and effort will need to go into digitizing, verifying and filling gaps to adapt existing data into a GIS environment. One recommended strategy is to prioritize data layers and to focus energy initially on those which are most important.

- Once a GIS system is established and begins to operate, a variety of individuals and departments will become potential users and beneficiaries. In addition to inventorying sites for wellhead protection, sites available for new industry and business can also be identified. Utility departments, finance departments, public safety departments and others will also find the new GIS system beneficial and it may be possible to establish a coalition of such users at the outset to share some of the costs of system development.

- Recommended hardware is at least a 486/66 or Pentium computer with at least 8 meg RAM and a 250 meg hard drive.

- GIS software is available from a number of sources—ARC/INFO was used by each of the pilot communities but today there are others such as Atlas GIS and IDRISI which are much more easily learned and operated.

To obtain a copy of the proceedings from this workshop, *Computer Applications for Local Wellhead Protection*, contact Dale Long at EPA Region III (215) 597-3427.



## ***Groundwater Guardian— Community Support Program May Interest Virginia Localities***

Groundwater Guardian is a community education and recognition program. It is designed to empower local citizens and communities to take voluntary steps toward protecting their ground water resources. The program is managed by the Ground Water Foundation, a private non-profit educational organization that is made possible through grants from the W.K. Kellogg Foundation and the Office of Groundwater and Drinking Water at the U.S. Environmental Protection Agency. The program is not officially sponsored by the Virginia Ground Water Protection Steering Committee but the Committee feels that the Guardian Program is valuable and wishes to call it to the attention of communities in Virginia.

The Groundwater Foundation believes that active citizens and communities are the keys to better ground water protection. The Foundation supports member communities by providing information and resources, by helping communities develop solutions and by linking them with regional and national networks. Groundwater Guardian is an annual designation for communities which exhibit a participatory approach to protecting ground water resources. Each year, participating communities submit an annual report outlining their progress in implementing their Result Oriented Activities. If a community has formed a Groundwater Guardian team, if it has identified activities to be carried out in pursuit of ground water protection, and if it has made significant progress towards

implementing one or more of those activities, then that community may be awarded the Groundwater Guardian recognition.

Groundwater Guardian communities are then recognized at local and national celebrations. They will also have the opportunity to display the official Groundwater Guardian logo on street signs, billboards, city stationery, water towers and elsewhere to advertise their towns as a community supporting ground water protection. Groundwater Guardian recognition demonstrates that a community is forward-thinking, that there are citizens who truly care about their community, its resources and the people who live there.

Tillery, North Carolina and Boise, Idaho were two of eight communities who obtained Groundwater Guardian status last year. Tillery is an unincorporated rural area of approximately 3000 people, located 100 miles northeast of the Raleigh-Durham metropolitan area which obtains the majority of its drinking water from individual shallow wells which are over 50 years old. Concerned citizens of Tillery have become involved in protecting their domestic ground water supply from intensive livestock production and other threats. Tillery's Result Oriented Activities include the preparation of a well location survey in order to obtain information on the number of wells, type of construction and the number of open wells. The community also identified the extent of its aquifer in order to better protect it. The geographic relationship between the aquifer and intensive hog operations will be determined in the future.

Idaho's state capital, Boise, serves as the business, cultural, and governmental center for most of the state. The greater urban area has a population approaching 250,000 inhabitants. Ground water wells, ranging from 30 feet to 1,000 feet deep, provide the majority of the drinking water needs within the Boise Valley. More than 80 public drinking water wells are located within the city limits and more than 10,000 wells exist within the Boise Valley.

Threats to the quality and quantity of ground water exist within the community. The shallow depths of many of the wells increases the possibility of land surface activities contaminating the water supplies. Boise has been identified as one of the fastest growing communities in the nation; thus, it is experiencing additional demands on ground water systems. In order to address these challenges and protect and ensure safe and adequate supplies for the city today and into the future, the Boise Groundwater Guardian Team planned the following activities: neighborhood ground water workshops, water awareness week, water conservation devices and Student's Investigating Today's Environment (an adopt-a-well program that enables high school students to get involved so that they may understand the resource and protect it).

No Virginia communities have taken advantage of the Groundwater Guardian program. Nevertheless, a number of communities in the state have already embarked upon ground water protection measures and could possibly benefit from participating in this program.

For more information, contact The Groundwater Foundation at 1-800-858-4844.

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## ***Publications & Resources Available***

- Proceedings from the EPA workshop, *Computer Applications for Local Well-head Protection*, are now available. Case studies of six communities which use Geographic Information Systems as part of their wellhead protection programs are included along with a general discussion of how GIS can be used to enhance wellhead protection. For copies, contact:

Dale Long  
EPA Region III  
841 Chestnut Street  
Philadelphia, PA 19107-4431  
Postage Code: 3WM42  
tel: (215) 597-3427

- *A Homeowner's Guide to Domestic*

*Wells* provides background information on ground water; discusses well construction, location, and maintenance; and provides information on protecting ground water resources from contamination. Originally published in 1985 by the Virginia Water Resources Research Center, this publication is being revised with distribution scheduled for December 1995. Funding for the project is provided by the Virginia Department of Environmental Quality through a ground water protection grant from the Environmental Protection Agency.

Five thousand copies will be produced and distributed to local health officials by the end of the year.

If you would like additional information about the publication or would like to be included on the distribution list, please contact Mary Ann Massie at the Department of Environmental Quality at (804) 698-4042.

- The following brochures are or will soon be available from Virginia Cooperative Extension

- *Septic System Maintenance - Septic Records*
- *Maintenance of Mound Septic Systems*
- *Maintenance of Low Pressure Distribution Systems*

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- *Alternative Wastewater Collection Systems*
- *Community Off-site Wastewater Treatment and Disposal Fact Sheet*
- *Virginia FARM\*A\*SYST Package (Version 2.0)*

These publications may be obtained by contacting:

Virginia Cooperative Extension  
Virginia Polytechnic Institute and  
State University  
Blacksburg, Virginia 24061-0303  
tel: (540) 231-6615.

- The following brochures are available from the Hampton Roads Planning District Commission
    - *Ground Water Resources in Hampton Roads*
    - *Hampton Roads Ground Water Resources: Water Quality Issues for the Region*
    - *Environmental Review #14: Regional Ground Water Management Program*
- Call (804) 420-8300.

### • ***Virginia On-Line***

This "world wide web" home page is accessible via the Internet and provides information from a growing range of state agencies and programs. Virginia On-Line's URL address is <http://www.state.va.us/>.

### • ***Spread the Word***

Do you know of an individual or organization who would benefit from receiving a copy of this and future Annual Ground Water Reports? Call Mary Ann Massie at (804) 698-4042 to add names to the mailing list.

Printed on Recycled Paper.



*Water quality preservation is everyone's concern.  
If you suspect a pollution incident has occurred, please call:*

**Department of Emergency Services**

**1-804-674-2400 24-hour hotline**